

NOTES ON SOME BLOOD-PARASITES IN MAN AND MAMMALS

BY

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I.

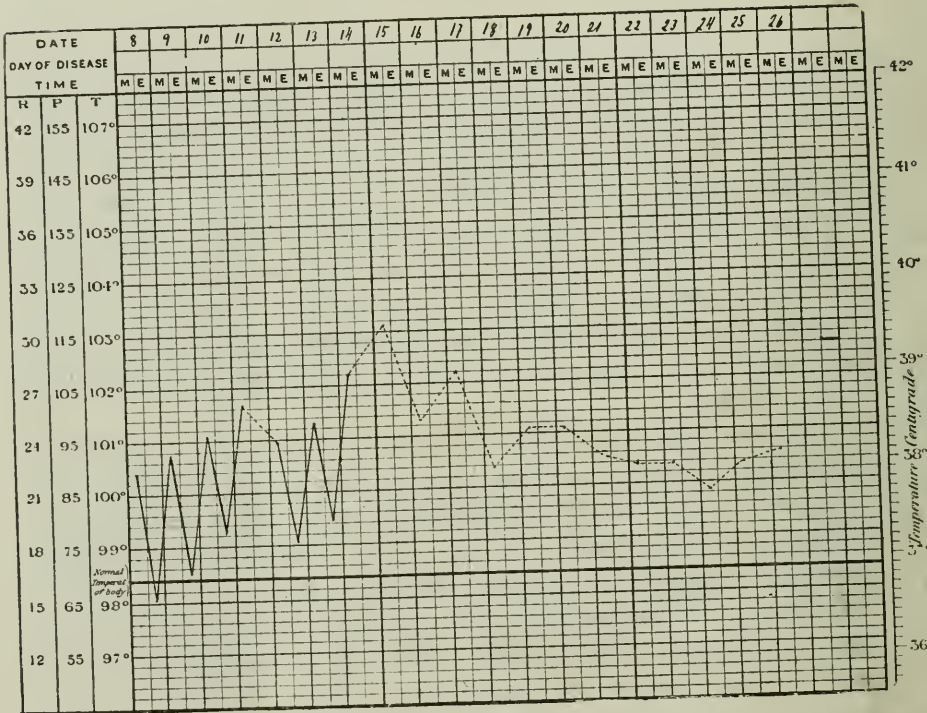
In a previous paper (1910) I briefly mentioned that I had observed, in Yucatán, various cases of non-classified fevers and that in one case I had found, in the blood, elements of an apparently parasitic nature. The publication of further particulars has been delayed in the hope of receiving material from similar cases, but it now seems advisable, although such material has not been obtained so far, to publish a summary of the one case observed, since it presents some special interest, when considered in connection with my observations (1909, 1911, 1 & 3) concerning the etiology of yellow fever.

The following are the essential clinical data:—A.O., 34 years, bullfighter, Spanish, was admitted to the lazaret in Mérida on August 5, 1910. Febrile symptoms had been present since the day before, and the patient, on his arrival, complained of intense headache, nausea, and slight abdominal pain of no certain localization. These symptoms continued, though less severe, during the patient's stay at the lazaret. He never felt seriously ill, even when the temperature was comparatively high. The fever was of an intermittent type, as shown in the accompanying chart (I), the maximum always occurring during the afternoon or night. Repeated examinations of the blood demonstrated the absence of malarial parasites. No hepatic or other organic affections were detected. The urine contained, on the fourth day of the disease, a trace of albumin and a few hyaline casts and gave a strong indican-reaction, but on other occasions no abnormal elements were found, especially no bile-pigments. Jaundice was not observed.

A differential leucocyte count on the eighth day of the disease gave the following result:—Polymorphonuclears 49·25 %, large mononuclears and transitionals 18·5 %, lymphocytes 32 %, eosinophiles 0·25 %.

The patient left the lazaret before the fever had subsided, but he appears to have eventually recovered and to have left the town shortly afterwards.

CHART I



Malarial fever was suspected, but, as no malarial parasites were found, no quinine was given to begin with, because the possibility of yellow fever had also to be considered, the patient being non-immune. Strong objections are made by most practitioners, in Yucatán as elsewhere, to the use of quinine in yellow fever. From the seventh day of the disease, however, 1 gram of quinine was given daily, without any apparent effect on the temperature.

On two occasions, on the fourth and eighth day, there were observed in Giemsa preparations of the blood (dry method) elements as those shown in Plate XXIV, figs. 1-5. They were fairly numerous on the fourth day, but scarce on the eighth, and absent on the ninth and tenth day.

These elements show a somewhat faintly stained body and a darker spot, which is, as a rule, situated in or near the periphery of the body. The faintly stained portion may be supposed to represent the cytoplasm, though its colour is a pale purple, and not the characteristic blue which is generally observed in protozoa; the dark red spot has the aspect of chromatin. Some slight variations are observed as to the shape and size of the cytoplasm, but, as a whole, the elements are fairly uniform. Many of the elements are apparently intracorpuseular, but it is difficult to say, whether they are really situated inside or on the surface of the erythrocytes. Others are extracorpuseular, either isolated or, as in fig. 5, forming groups. The largest diameter of the bodies is about $0\cdot7-1\cdot1\ \mu$.

The aspect of these bodies seems to indicate their being parasites; this impression was also that of Professor Nuttall, who very kindly examined one of the slides with me. Other possibilities are that they might represent nuclear granules or blood platelets. With regard to the first possibility it may be noted that one or two nucleated erythrocytes were observed in several of the slides, but no transitions were seen between such nuclei and the bodies described. The presence of a well-differentiated body (cytoplasm) besides the chromatin is also a strong argument against this possibility. With regard to blood platelets, such were seen in all parts of the specimens, also in the vicinity of the supposed parasitic bodies, but they differed entirely from the latter in structure. In fact, the blood platelets present showed no peculiar morphological features when compared with those in other blood smears, stained according to the same technique.

The well-defined structure of the bodies seems to me to exclude the possibility that they might be cocci.

Evidently there is no question of confusion with malarial parasites. The bodies show a slight resemblance with *Babesia* and probably also with Theiler's (1910, 1 & 2) *Anaplasma marginale*, though in the latter apparently no cytoplasm is discernible,

according to Theiler, and also to Sieber (1911), and they are not unlike the 'yellow fever bodies' which I have described and believe to be the parasite of that disease, and for which I have recently proposed the name of *Paraplasma flavigenum* (1911, 3). They differ, however, from these bodies in being nearly uniform in size and shape, whilst the *Paraplasma flavigenum* shows considerable variations. Other differences are that the present bodies are largely extracorporeal and that their cytoplasm does not show a clear blue staining after Giemsa, as is often, though not always, seen in the case of the yellow fever bodies. In the latter, again, double chromatin spots are frequent, but have not been observed in the present bodies.

Moreover, the disease in which they were found differed considerably from the ordinary clinical picture of yellow fever. We know, of course, that yellow fever may reveal different characters, and it has to be considered that the patient was a non-immune in a yellow fever country, but I would not be inclined to accept this case as one of yellow fever without absolutely convincing proofs.

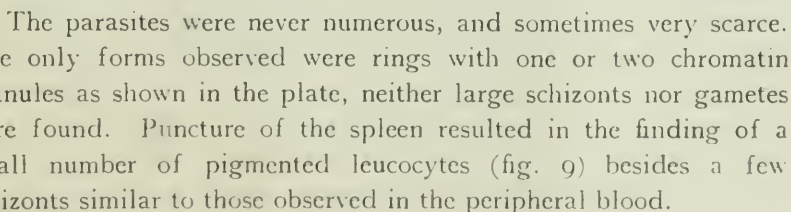
A number of cases of unclassified fevers were observed in Yucatán by other physicians as well as by myself, and it appears not at all unlikely that yellow fever may be one of a group of diseases produced by blood-inhabiting parasites, which may be different, but more or less intimately related to each other. Similar differences might, perhaps, account for the differences in the clinical pictures of yellow fever in various countries, to which I have recently called attention (1911, 2), and thus account also for some of the obscure points in the epidemiology of yellow fever.

Should this hypothesis prove correct, the case here described would probably belong to the same group of diseases, and its parasite be another species of the same genus as the yellow fever parasite. In this case a suitable name would be *Paraplasma subflavigenum*.

A type specimen has been deposited in the collection of the Liverpool School of Tropical Medicine.

For the clinical history I am indebted to Drs. Canto and Vargas, who kindly invited me to see the patient with them.

CHART II



This observation is, of course, incomplete, but the forms observed were very similar to young schizonts of *Plasmodium praecox*, and the parasite probably belongs to the genus *Plasmodium*. Similar parasites in apes have been described by Kossel (1899), Lühe (1906), Dutton, Todd and Tobey (1906), Halberstädter and v. Prowazek (1907), Mayer (1907, 1908), Flu (1908), and Gonder and Berenberg-Gossler (1908).

III.

A disease is observed in Yucatán in imported cattle, which is known as yellow fever of the cows. I had the opportunity of examining blood smears from two such cases, and found small intracorpuscular parasites, apparently a species of *Babesia*. No drawings were, however, made at that time, and my preparations have now faded to a considerable degree. The forms observed were small solid protoplasmic bodies with a single chromatin spot or ring-shaped bodies with two or three chromatin granules. In the smallest forms the protoplasm was extremely scarce, or seemed entirely absent, so that only a chromatin spot was seen. No division forms were observed.

Clinically, the disease was characterized by fever, jaundice, oliguria and diarrhoea. The urine was only examined once, in a fatal case on the day before death; it contained albumin and bile-pigments, but neither haemoglobin nor blood corpuscles. The disease was said to last for about a week in fatal cases, and anuria to be frequent shortly before death. The mortality was said to be very high.

On a cow which I observed shortly before it died, a few ticks were found, as also on other members of the same herd. A specimen was sent to Professor Nuttall, who kindly informed me that it belonged to the species *Boophilus australis*, and that it had been embodied in his catalogue under the number 1019.

IV.

Trypanosoma lewisi was found in about 50 % of rats examined.

Malarial parasites were found in sixty-nine cases examined in the laboratory, besides in some private cases. The species observed has been stated in fifty-one cases. *Plasmodium vivax* was present alone in nine cases, *P. malariae* in two, and *P. praecox* in 37; *P. praecox* was seen together with *P. vivax* in two cases, and together with *P. malariae* in one case.

No case of malaria seemed to have originated inside the city proper, and in one case only did it seem probable that infection had taken place in a suburb, all the other patients had been exposed to infection in the country or in other places.

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EXPLANATION OF PLATE XXIV

The figures have been drawn by Mrs. Margrethe Seidelin with Abbé's camera lucida. Zeiss. Apoch. Obj. Imm. 3 mm., Comp. oc. 12.

Figs. 1-5.—Parasites from human blood. $\times 1300$.

Figs. 6-8.—*Plasmodium* sp., from blood of *Ateles* sp. $\times 1400$.

Fig. 9.—Pigmented leucocyte (transitional form) from spleen of *Ateles* sp. $\times 1400$.

1



2



3



4



5



6



7



8



9

